

Remarks on *Distorsio constricta*
(Broderip, 1833) and Related Species in the
Eastern Pacific Ocean, with the
Description of a New Species
(Gastropoda: Personidae)

by

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Abstract. The eastern Pacific species of the tonnacian genus *Distorsio* are reviewed; four species are recognized. Until recently, only two species of *Distorsio* were believed present in the eastern Pacific, namely *D. decussata* (Valenciennes, 1832) and *D. constricta* (Broderip, 1833). PARTH (1989a, b, 1991a), however, divided the long-held concept of *D. constricta* (*sensu stricto*) into three species. In addition to the nominate species, he recognized a second form as a new species, namely *D. minoruohnishii* Parth (1989b); and he referred a third form to *D. ridens* (Reeve, 1844a), a taxon recently assigned to the synonymy of *D. clathrata* (Lamarck, 1816) from the western Atlantic (EMERSON & SAGE, 1990a, b). We reject the attribution of the third form to *D. ridens* and describe it as a new species. The four species here recognized are *D. decussata* (Valenciennes, 1832), *D. constricta* (Broderip, 1833), *D. minoruohnishii* Parth, 1989, and *D. jenniernestae* Emerson & Piech, new species. A neotype is selected for *D. decussata*.

INTRODUCTION

PARTH (1989a, b, 1991a) has recently commented on the taxonomic status of the eastern Pacific species of *Distorsio*. In addition to the two west American species previously recognized by KEEN (1971:508), *D. decussata* (Valenciennes, 1832) and *D. constricta* (Broderip, 1833), he concluded that the latter is a complex comprised of three distinct taxa. He recognized, in addition to the nominate form, two other forms. For one of these newly recognized forms, he proposed a new species, *D. minoruohnishii* Parth (1989b), and he (PARTH, 1991a) referred the third form to *D. ridens* (Reeve, 1844), which was recently placed in

the synonymy of *D. clathrata* (Lamarck, 1816) by EMERSON & SAGE (1990a, b). We take this opportunity to review the status of these taxa on the basis of specimens from collections newly available to us.

Abbreviations

The following abbreviations for institutions and expeditions are used in the text.

AHF—Allan Hancock Foundation Pacific Expeditions, University of Southern California (collection transferred to LACMNH; for station data, see FRASER, 1943).

- AMNH—American Museum of Natural History, New York.
- BM(NH)—The Natural History Museum, London [formerly The British Museum (Natural History)].
- CASIZ—California Academy of Sciences, Invertebrate Zoology, San Francisco, California.
- DMNH—Delaware Museum of Natural History, Wilmington, Delaware.
- DSIR, GG—DSIR Geology and Geophysics, Lower Hutt, New Zealand.
- LACMNH—Los Angeles County Museum of Natural History, Los Angeles, California.
- NMNH—National Museum of Natural History, U.S. National Museum collection (USNM), Smithsonian Institution, Washington, D.C.
- P-AMNH—Puritan-American Museum of Natural History Expedition to Western Mexico (for station data, see EMERSON, 1958).
- TCE—Templeton Crocker Expeditions, New York Zoological Society (collection deposited in the AMNH and CASIZ; for station data, see BEEBE, 1937, 1938).

Historical Review of the Eastern Pacific *Distorsio constricta* Complex

Before PARTH's (1989–1991) recent work, only two species of *Distorsio* were generally recognized in eastern Pacific waters, namely *D. decussata* (Valenciennes, 1832) and *D. constricta* (Broderip, 1833). Owing largely to the failure of Valenciennes to illustrate his taxon, there had been a long period prior to the acceptance of this duospecies concept in which these taxa were confused (*cf.* TRYON, 1880: 35; DALL, 1908:319; PILSBRY, 1922:359; WOODRING, 1928: 101). These authors either did not recognize *D. decussata* as a west American species, or, if they did, they mistakenly considered *D. constricta* to be a junior synonym of *D. decussata*. Eventually, PILSBRY & OLSSON (1941:40, pl. 5, figs. 9, 12) clarified the differences between the two taxa by stating: "It has been commonly believed that but one *Distorsio* was found living in the Panama Province but actually there are 2 well-marked species, *Distorsio decussatus* Val., described from Acapulco, and *Distorsio constrictus* Broderip, described from Santa Elena, and well figured by Reeve, (1844, Conch. Icon., *Triton*, pl. 12, fig. 41). The 2 species are easily separated even when they occur together, as they do at several places along the Ecuadorian and Panamic coast. *Distorsio constrictus* is a strongly distorted shell, the aperture and particularly the inner lip being strongly tuberculate with a short but strongly recurved anterior canal. *Distorsio decussatus* is a more slender, regular and thinner shell; the parietal callus is smoother, and the anterior canal is longer and nearly straight. In both species the spiral cord on the shoulder or periphery of the body-whorl is doubled." The erroneous monospecies concept, however, was still held by some workers as late as KILIAS' review (1973:207, 208) of the "Cymatiidae."

Actually Dr. Woodring had accepted the duo status (*in litt.*, to W. K. Emerson, 1 May 1954) following the publication of a catalog of the genus *Distorsio* (EMERSON & PUFFER, 1953:98, 99; see WOODRING, 1959:205) and this concept was held by virtually all workers (*cf.* LEWIS, 1972: 46). Therefore, until recently, *D. constricta* and *D. decussata* were believed to be largely sympatric, the former known from the Gulf of California, Mexico, to Mancora, Ecuador, and the latter from the Gulf of California to Manta, Ecuador (KEEN, 1971:508).

PARTH (1989a:53, illus. 2nd row, right side) reported two "typical" specimens of the western Pacific species *Distorsio habei* LEWIS (1972:38, figs. 38, 39) in a lot from "Oaxaca," Mexico, mixed with specimens of *D. decussata* (VALENCIENNES, 1832:306) and *D. constricta* (BRODERIP, 1833:5). According to Dr. Beu (*in litt.*, to W. K. Emerson, 25 October 1991), a specimen sent to him by M. Parth as *D. habei*, from "Oaxaca," Mexico, is a specimen of *D. perdistorta* FULTON (1938:55, pl. 3, fig. 3, 3a), again a species not otherwise known from the eastern Pacific. The validity of this record was previously questioned (EMERSON, 1991:68, footnote 30). Until eastern Pacific specimens of *D. habei* with unequivocal locality data are forthcoming, we question Parth's west American records for this taxon. In the same paper, PARTH (1989a:52, illus. 2nd row, right side) figured a specimen from "Oaxaca" as "*D. constricta constricta*." This is the same specimen he subsequently designated as paratype 8 of his new species, *Distorsio (Distorsio) minoruohnishii* Parth (1989b), which he shortly thereafter differentiated from *D. constricta*.

Subsequently, PARTH (1991a) called attention to the presence of a third morphological form in the *Distorsio constricta* complex. He believed that it was referable to *D. ridens* (Reeve, 1844a), which was recently referred to the synonymy of *D. clathrata* (Lamarck, 1816), a western Atlantic species (EMERSON & SAGE, 1990a, b). Thus, he split this complex into three taxa, namely *D. constricta* (Broderip, 1833), *D. minoruohnishii* Parth, 1989, and *D. ridens* (Reeve, 1844), *sensu* PARTH (1991a).

Before discussing the status of *Distorsio ridens* and our reasons for rejecting Parth's assignment of the third form of this complex to *D. ridens*, we should comment on this newly recognized form and its relation to *D. constricta (sensu stricto)* and *D. minoruohnishii*. Fortunately, three syntypes of *D. constricta* are extant in The Natural History Museum, London (BM[NH] 1989016; Figures 2, 3), and there is no doubt of the concept of this taxon. Both *D. constricta* and the third form believed to be *D. ridens* by Parth have larger, more distorted shells than *D. minoruohnishii*, of which the largest known specimen is 51.6 mm in height (AMNH 232209); in contrast, the height of *D. constricta* and the third form may exceed 60 mm (64.3 mm [LACMNH 70-15.12] and 64.1 mm [AMNH 232215], respectively).

PARTH (1991a:10) noted two major differences between *Distorsio constricta* and the form he believed referable to

D. ridens, namely the presence of a "big notch" on the "upper part of the outer lip, almost at the second tooth level"; and, secondly, the "color of the inner and outer lip, subdiscoidal-shaped, ranges from light orange to dark brown." He did not mention the large white area of the parietal shield that extends into aperture. As noted by Parth, the third form has a distinctive groove on the interior of the outer lip located at the periphery of the body whorl. This "big notch" (Figure 18), however, is not formed in juvenile specimens, for example those with fewer than six postnuclear whorls (Figures 16–18). This groove is a prominent feature in mature specimens and is lacking at all growth stages in *D. constricta* and *D. minoruohnishii*. Also, the color pattern and sculptural details differ markedly between *D. constricta* and the third species, as noted by Parth. We do agree that there are three distinct forms in this complex, but we disagree with Parth's belief that the third form is referable to *D. ridens*.

Distorsio ridens (Reeve, 1844a, b) was for a long time an enigmatic species, the status of which has been reviewed in recent years by LEWIS (1972), EMERSON & SAGE (1990a, b), and, most recently, by PARTH (1991a). LEWIS (1972) could not locate the figured specimen in The Natural History Museum, London, and he selected a lectotype in the American Museum of Natural History (AMNH 6369). He believed *D. ridens* represented a valid taxon of probable Indo-Pacific origin of which additional specimens had yet to be discovered. EMERSON & SAGE (1990a, b) concluded that Reeve's taxon was referable to *D. clathrata*, a common western Atlantic inhabitant. PARTH (1991a) considered the third form in this eastern Pacific complex to be the taxon that REEVE (1844a:fig. 46) described and illustrated as "*Triton*" *ridens* from the "Philippine Islands." We reject this attribution.

We describe herein this third form as a new species and reject its allocation to *Distorsio ridens* for the following reasons:

(1) The degree of distortion depicted in REEVE's illustration (1844a:fig. 46) of *D. ridens* is slight, whereas in the new species, as well as in the illustration by REEVE (1844a:fig. 41) of *D. constricta*, the specimens are severely distorted (cf. Figures 1 and 9 with Figures 5–8). Furthermore, all of the specimens of the new species we have examined, some 40 specimens, as well as the specimens figured by PARTH (1990a:11, 1st row) have similar degrees of distortion. We believe that the artist, G. B. Sowerby, II, certainly would have recognized the distorted nature of the shell, as he did for *D. constricta*, if he had had before him a specimen of the new species to draw. In contrast, Reeve's figure of *D. ridens* depicts a shell with a degree of distortion that is similar to that of Lewis' lectotype of *D. ridens* and to specimens of *D. clathrata* from the western Atlantic Ocean (cf. Figure 9 with Figure 12).

(2) The sculptural details of the parietal shield in the drawing of *D. ridens* (Figure 9) show the axial ribs extending from the suture to the base of the parietal shield.

In mature specimens of the new species, the axial ribs are posteriorly wanting, as they extend only about half the distance from the suture to the middle portion of the shield (Figures 6, 8). The axial ribs, however, do extend from the suture to the aperture in *D. clathrata* (cf. Figure 9 with Figures 10, 12). The early plicae on the mid to lower columellar wall are prominent and the first plica is bifid in REEVE's (1844a) drawing of *D. ridens*, but they are small and not bifid in the new species. Moreover, they are large and not uncommonly bifid in *D. clathrata* (see EMERSON & SAGE, 1990a:figs. 1, 14, 15).

(3) There is no mention in REEVE's (1844a, b) descriptions of *D. ridens* of a depression ("big notch") on the outer lip, nor is one depicted in the REEVE's illustration (1844a:fig. 46). The wrinkle-like fold above the first anteriorly placed plica on the outer lip as shown in Reeve's drawing (Figure 9 herein) is not uncommonly found on the outer lip of *D. clathrata* and is situated above the location of the "big notch" of the new species (cf. Figures 9, 10, 12).

(4) The drawing of *D. ridens* (REEVE, 1844a:fig. 46; Figure 9 herein) shows the orange-brown pigmentation extending over the surface of the parietal shield as is often the case in specimens of *D. clathrata* (Figure 12). In the new species, the columellar surface immediately above the aperture is a glossy white (Figures 6, 8).

PARTH (1991a:10) objected to the placement of *Distorsio ridens* in the synonymy of *D. clathrata* largely on the basis of two criteria that do not characterize *D. clathrata*. These are the single cording of the ribs on the dorsum and the length of the siphonal canal. In the new species, the spiral cords at the periphery of the whorls are "duplicated," or are even "triplicated" in some specimens. REEVE's (1844a:sp. 46) description of *D. ridens* states that the "whorls [are] elegantly latticed with prominent, narrow, raised ridges, transverse ridges duplicate." Actually, the apertural view of REEVE's illustration (1844a:fig. 46; Figure 9 herein) does not project the presence of "duplicated" spiral cords on the periphery of the body whorl. Unfortunately, a view of the dorsal surface of the illustrated specimen was not provided by Reeve. The presence of a double cord would be, of course, in contrast to the single spiral cord on the periphery of *D. clathrata* (Figures 11, 12). The duplicate sculpture is characteristic of *D. decussata* as noted by EMERSON & SAGE (1990a:134), and *D. ridens* was referred to this taxon by BEU (1985:62) and PARTH (1989a:54). Beu (*in litt.*, to W. K. Emerson, 17 January 1990) subsequently concluded that *D. ridens* was referable to *D. clathrata* based on the identify of the lectotype of *D. ridens* (Figures 10, 11).

PARTH (1991a:10) also believed that Reeve had never personally examined specimens of *Distorsio clathrata* before he described *D. ridens*, and, therefore, the specimen illustrated by REEVE (1844:fig. 46) could not have been referable to *D. clathrata*. It should be noted, however, that Reeve was an associate of Broderip and had access to his collection. BRODERIP (1833:5) in his description of *D. constricta*

Table 1
Shell comparisons of the four Recent species of eastern Pacific *Distorsio*.

	<i>Distorsio constricta</i>	<i>Distorsio minoruohnishii</i>	<i>Distorsio jenniernestae</i>	<i>Distorsio decussata</i>
Distortion	Most distorted.	Slightly less than <i>D. constricta</i> .	Almost the same as <i>D. constricta</i> .	Least distorted.
Sculpture of body whorl	8–13 major axial ribs forming nodules where they cross spiral cords, double at the periphery.	9–11 major axial ribs forming nodules where they cross spiral cords. 12–14 major spiral cords, double at the periphery.	10–13 major axial ribs forming nodules where they cross spiral cords, double or triple at the periphery.	12–17 major axial ribs forming nodules where they cross spiral cords, single or double at the periphery.
Color	Body tan, darkest of the 4 species. Shield and outer lip darker than the body. Aperture white.	Body tan to straw color, early whorls darker. Dark band around the periphery of body whorl. Shield and outer lip cream color. Aperture white.	Body varying between straw and white. Shield and outer lip have dark brown edge. Aperture white.	Body mostly white, some straw color. Shield and lip white with some light tan staining around the edge. Aperture white.
Parietal shield	Strong beading. Lower left-hand edge of shield just barely away from the body.	Weak beading. Left-hand edge of shield noticeably extends away from the body.	Smooth to low beading. Left-hand edge of shield noticeably extends away from the body.	Smooth to low beading. Left-hand edge of shield noticeably extends away from the body.
Siphonal canal	Open, angles slightly to the right, recurves to the back. Shortest canal of the 4 species.	Open, angles slightly to the right, recurves to the back. Slightly longer than <i>D. jenniernestae</i> .	Open, angles slightly to the right, recurves to the back. Slightly longer than <i>D. constricta</i> .	Open, straight, recurves to the back. Longest canal of the 4 species.
Outer edge of lip	Thick, straight.	Thinner than <i>D. constricta</i> flaring at the lower edge.	Thinner than <i>D. minoruohnishii</i> . Flaring at the lower edge. Lip with a marked depression at the periphery of the body whorl, unique to this species.	Thin like <i>D. jenniernestae</i> and flaring at the lower edge.
Inner edge of lip	8 plicae, 3rd one slightly larger.	8 plicae, 3rd one slightly larger.	8 plicae, very prominent 3rd plica.	5–8 plicae, very prominent 3rd plica.
Prominent columnar plicae	1 in posterior end. 1 on left side above siphonal canal extending into aperture.	1 in posterior end. 1–2 on left side above siphonal canal extending into aperture.	1 in posterior end. 1 on left side above siphonal canal extending into the aperture.	1 in posterior end. No plicae extending into the aperture above the siphonal canal.
Periostracum (outer surface)	Tan-brown color with very numerous soft, short hairs forming a velvet texture.	Tan-brown color with very numerous soft, short hairs forming a velvet texture. Longer individual hairs at many of the intersections of the axial ribs and spiral cords.	Tan-brown color with very numerous soft, short hairs forming a velvet texture. Longer darker hairs forming clusters along the axial ribs.	Dark-dark brown colored (covering a thin straw colored basal layer) with longer, individual hairs at the intersection of the axial ribs and spiral cords.

actually compared it with *D. clathrata*. Furthermore, REEVE (1844a:sp. 45) cited "*Triton clathratus* Lamarck" [= *Distorsio clathrata*] in the synonymy of "*Triton cancellinus*" [= *D. reticularis* Linné, *vide* BEU, 1987:314], and he subsequently compared *D. ridens* with "*Triton cancellinus*" (REEVE, 1844b:115). The status of *D. clathrata* at that time was poorly understood and specimens of *D. clathrata* were confused with specimens of *D. reticularis* from the Indo-Pacific (PUFFER, 1953:109).

The siphonal canal, Parth's second point of difference, is indeed longer and less recurved in *Distorsio clathrata* than in the new species. However, the siphonal canal is shortened by breakage in the lectotype of *D. ridens* (Figure 10) and this may have been the case of the specimen figured by REEVE (1844a:fig. 46), which is depicted with a narrow siphonal canal, unlike the widely open canal of the new species (*cf.* Figure 9 with Figures 6, 8).

Despite these possible disparities, the gross angular dis-

tortion of the whorls that characterizes the new species, together with the other differences (Table 1), serves in our opinion to separate it from *Distorsio ridens*.

We take pleasure in naming the new species for Jennifer Ernest, the daughter of Gladys and James Ernest, who kindly provided us with critical specimens for this review.

SYSTEMATIC TREATMENT

Superfamily TONNACEA Suter, 1913

Family PERSONIDAE Gray, 1854

Genus *Distorsio* Röding, 1798

Synonyms: *Distortrix* Link, 1807; *Persona* Montfort, 1810; *Distorta* Perry, 1811; and *Rhysema* Clench & Turner, 1957; see BEU (1987:310; 1988:89).

Type species: *Distorsio anus* (Linné, 1758) by subsequent designation of PILSBRY (1922:357).

Distorsio (Distorsio) constricta (Broderip, 1833)

(Figures 1–4, 23)

Triton constrictus BRODERIP, 1833:5; REEVE, 1844: *Triton* sp. 41, pl. 12, fig. 41 [May, 1844].

Distorsio constrictus Brod. [erip]: TRYON, 1880:35, in part, pl. 17, fig. 176 only [copy of REEVE, 1844:fig. 41], not *Distorsio cancellinus* Roissy, *sensu* TYRON, 1880:35; PILSBRY & OLSSON, 1941:40, pl. 5, fig. 12, Manta, Ecuador (Recent specimen); KILIAS, 1973:203, 204, fig. 145, "Peru," in part, excluding references to *Distorsio decussata* (Valenciennes, 1832).

Type locality: "Hab. ad Montem Christi et Xipixapi" (BRODERIP, 1833:5). "Monte Christi and Xipixapi, West Columbia (dredged from sandy mud at a depth of from seven to ten fathoms; Cuming)" (REEVE, 1844). Restricted by M. SMITH (1944:23) to St. Elena [= Xipixapa], Ecuador.

Type depository: Lectotype, 60.8 × 36.1 mm (Figures 2, 3) and 2 paralectotypes, 60.7 × 34.6 and 54.7 × 31.1 mm, respectively (BM[NH] 198016).

Distribution: Islas Murcielago, Guanacaste Prov., Costa Rica, to Manta, Ecuador.

Specimens examined: COSTA RICA: Off Quepos, Puntarenas Prov. (9°22.20'N, 84°09.3'W) in 23 m, 1 specimen, J. McLean *leg.* (LACMNH 72-59.1); Isla San Pedrito, Islas Murcielago (10°51.5'N, 86°57.95'W), in 2.4–4 m, 1 specimen, J. McLean *leg.* (LACMNH 72-22.2). PANAMA: Golfo de Panamá, Isla Venado, –2.4 tide, 5 April 1981, 1 specimen (AMNH 207600), *ex* H. DuShane coll.; Isla Venado, 2 specimens (LACMNH 34643); Isla Venado, –1.8 tide, in silty runnels, night 16 March 1980, 2 specimens (AMNH 232205), *ex* H. DuShane coll.; Isla Venado, beach, 2 specimens (AMNH 232206), *ex* A. Marti coll.; Isla Venado, 8 March 1970, 1 specimen, J. McLean *leg.* (LACMNH 70-15.12); Isla Bono, Islas Otoque, in 9–

27 m, 2 specimens, J. McLean *leg.* (LACMNH 65-21.9); Isla Secas, Chiriqui Prov., in 27 m, AHF station 34-125, 1 specimen (LACMNH 34-125.4); Bahía Honda, Veraguas Prov., in 9–15 m, AHF station 33-120, 1 specimen (LACMNH 33-120.2); "Panama Bay," intertidally, in sandy mud, 4 specimens (AMNH 232191), *ex* Abbey Specimen Shells. COLOMBIA: Off Isla Gorgona, in 18 m, AHF station 34-98, 1 specimen (LACMNH 34-98.2). ECUADOR: Off Cape San Francisco, in 27 m, AHF station 38-118, 1 specimen (LACMNH 38-118.6); Manta, J. Marks *leg.* (CASIZ 37339).

Remarks: There are in The Natural History Museum, London, three specimens (BM[NH] 198016) that were identified as syntypes by Aileen Blake (A. Beu, *in litt.*, to W. K. Emerson, 25 October 1991). These are large specimens (H = 61.2, 60.9, and 54.7 mm), each of which is badly faded, but otherwise well preserved. The second largest, which has some of the periostracum still preserved, appears to be the specimen illustrated by REEVE (1844a: fig. 41) and is here selected as the lectotype (*cf.* Figure 1 with Figures 2, 3). The old labels accompanying the syntypes cite "Monte Christi and Xipixapi" as the type localities, which are BRODERIP's (1833:5) citations for the habitat.

Distorsio (Distorsio) minoruohnishii
Parth, 1989

(Figures 13–15a, b, 25)

Distorsio constricta constricta (Broderip): PARTH, 1989a:52, in part, 6 unnumbered figs., specimen in 3rd row, on right side, "Oaxaca, W. messico" [sic]; not *Distorsio constricta* (Broderip, 1833).

Distorsio minoruohnishii PARTH, 1989b:8–11, holotype illustrated on p. 8, holotype and 9 paratypes illustrated on p. 11; PARTH, 1991a:11, 3rd row, first two specimens illustrated on left side of plate.

Type depositories: Holotype (BM[NH] 1990025), *fide* PARTH (1991b:21; here illustrated in Figure 15a, b). Nine paratypes cited and illustrated (PARTH, 1991a:9) from Mexico and Panama. One of these, paratype 2, from the "Bay of Chiriqui, Panama" is deposited in the AMNH (246024).

Type locality: "Oaxaca, Mexico" [the Mexican state] cited for the holotype (PARTH, 1989b:9). Here restricted to off "Isla Macapule, [Sinaloa], Mexico" (PARTH, 1989b:9; paratype 9; and 28 topotypes AMNH 174247, 186686, and 232198; Figures 13, 14).

Distribution: Golfo de California, Mexico, to off Tumbes, Peru.

Specimens examined: MEXICO: Gulf of California, Baja California Norte: Off Isla San José, P-AMNH Station 116, in 67 to 73 m, 2 specimens (AMNH 76180); off Puerto Escondido, P-AMNH Station 138, in 33 to 36 m, 1 specimen (AMNH 76493); Baja California Sur, Punta



1



2



3



4



5



6



7



8



9



10



11



12

Arena Bank, TCE Station 136-D-17, in 82 m, 4 specimens (AMNH 94097); Gorda Bank, TCE Station 150-D-32, in 165 m, 29 specimens (AMNH 140269). Bahía Los Frailes, P-AMNH Station 89, in 36 to 73 m, 2 specimens (AMNH 75807); off Punta Coyote, La Paz Bay, dredged in 45 m, 3 specimens, *ex* Abbey Specimen Shells (AMNH 183767); south of La Paz, dredged, 5 specimens, *ex* C. Skoglund coll. (AMNH 186684). Sonora: Bahía Kino, trawled, 2 specimens, A. Luna *leg.* (AMNH 232210); off Guaymas, shrimp boat, 2 specimens, *ex* T. Rice coll. (AMNH 180703); Puerto Guaymas, in 33 m, 4 specimens, *ex* R. Purdy coll. (AMNH 240421); off Guaymas, dredged by fishermen, 1 specimen, G. Eddison coll. (AMNH 232203). Sinaloa, Isla Macapule (south of Bahía de Topolobampo), in 45 m, 22 specimens (together with 4 specimens of *Distorsio jenniernestae*, sp. nov.), A. Luna *leg.*, *ex* H. DuShane coll. (AMNH 174247, 232198); same locality and data, *ex* C. Skoglund coll., 6 specimens (AMNH 186686). Nayarit, Islas Las Tres Marías, off Isla María Magdalena, P-AMNH Station 71, in 23 to 27 m, 1 specimen (AMNH 75379), Isla María Madre, P-AMNH Station 72, in 25 to 27 m, 1 specimen (AMNH 75529); Colima, off Manzanillo, in 15–22 m, 4 specimens, *ex* S. Bennett coll. (AMNH 232207); off Manzanillo, in 31 m, 2 specimens, *ex* H. DuShane coll. (AMNH 232204). COSTA RICA: Isla Tortuga, 1 specimen, *ex* K. Vaught coll. (AMNH 214705); Bahía Ballenas, in 64–73 m, TCE Station 213-D-11-17, in 64 m, 3 specimens (AMNH 85336a) (together with 2 specimens of *D. jenniernestae*); between Bahía Elena and Bahía Juanillo (85°46.13'W), in 26–53 m, 2 specimens (LACMNH 72-12.4); off Bahía Herradura (9°38.8'N, 84°40.8'W), in 37 m, 3 specimens, J. McLean *leg.* (LACMNH 72-54.4). PANAMA: Golfo de Panamá, Palo Seco, 3 specimens, E. Bergeron *leg.* (AMNH 156620); Isla de los Perlas, 3 specimens (AMNH 123002); Golfo de Montijo, off Isla Gobernadora, 1 specimen, *ex* B. Piech coll. (AMNH 239212). Golfo de Chiriquí, paratype 2, *ex* M. Parth coll. (AMNH 246024). COLOMBIA: Off Puerto Utria, in 82 m, AHF Station 35-54, 1 specimen (LACMNH 35-54.1). ECUADOR: Off Santa Elena, in 15–18 m, AHF Station 34-83, 1 specimen (LACMNH 34-83.6). PERU: Between Caleta La Cruz and Puerto Pizzaro, off Tumbes (3°28'S, 80°36'W), in 9–33 m, 3 specimens,

J. McLean *leg.* (LACMNH 72-83.6). (An additional 40+ lots in the LACMNH and AMNH collections from Mexico, Costa Rica, and Panama were examined but are not recorded owing to redundancy.)

Remarks: The holotype (BM[NH] 1990025; Figure 15a, b herein) is a small, well-preserved, crabbed specimen, with 6 postnuclear whorls, and measures 38.3 mm in height and 21.3 mm in width. Mature examples with 7 postnuclear whorls attain 51+ mm in height (AMNH 232209, Gulf of California). Some of the more ovate specimens approach Philippine specimens of *Distorsio habeii* in many characters, but differ mostly in the degree of distortion of the whorls, in some of the details of the apertural dentition, and in the possession of a less recurved siphonal canal (*cf.* Figures 13–15 with Figures 19, 20).

Distorsio (Distorsio) jenniernestae

Emerson & Piech, sp. nov.

(Figures 5–8, 16–18, 24)

Distorsio (Rhysema) constricta (Broderip): EMERSON & OLD, 1963:26, in part, fig. 24, off Isla Tiburón, Gulf of California; KEEN, 1971:508, in part, fig. 962, Gorda Bank, Gulf of California (CASIZ coll.); LEWIS, 1972:45, in part, fig. 41, off Santa Cruz Id., Galapagos Islands; KERSTITCH, 1989:45, in part, fig. 89 (colored photograph of living animal); not *Distorsio constricta* (Broderip).

Description: Shell, large (attaining 60+ mm in height), fusiform, very much distorted, spire attenuately acuminate (spire produced at an angle of about 45°), with 7 postnuclear whorls angulated at the upper part, and 2½ smooth, glossy embryonic whorls (Figure 24). Surface of body whorl sculptured with 10 to 13 major axial ribs and numerous spiral cords forming nodules at the intersections; nodules on periphery of the shoulder largest, crossed by 2 or 3 spiral cords. Aperture large, outer lip thin at edge with 3 distinct plicae (the third being the largest) on the upper (posterior) portion, disjunct from the outer edge, and with 5 or 6 broken denticles on the lower (anterior) portion. Outer lip with a large depression (groove) formed

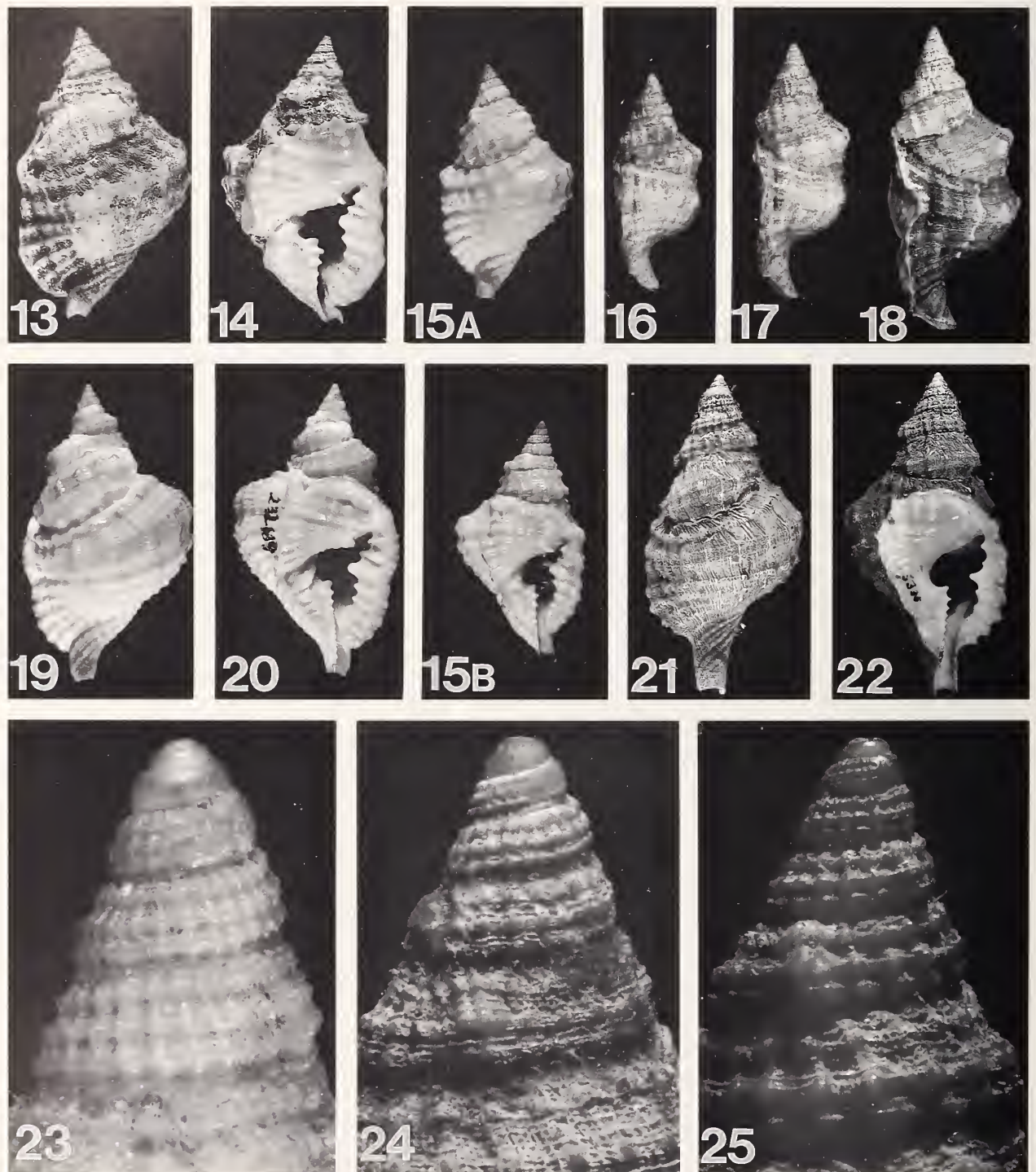
Explanation of Figures 1 to 12

Figures 1–4. *Distorsio constricta* (Reeve). Figure 1: copy of illustration of *Triton constrictus* Broderip (REEVE, 1844a: pl. 12, fig. 41). Figures 2, 3: lectotype of *Triton constrictus* (BM[NH] 198016). Figure 4: specimen with fully developed apertural morphology (LACMNH 70-15.12).

Figures 5–8. *Distorsio jenniernestae*, sp. nov. Figures 5, 6: holotype (AMNH 232214). Figures 7, 8: paratype (AMNH 232215).

Figures 9–12. *Distorsio clathrata* (Lamarck, 1816). Figure 9: copy of illustration of *Triton ridens* REEVE (1844a: pl. 12, fig. 46). Figures 10, 11: lectotype of *Distorsio ridens* (AMNH 6369). Figure 12: specimen from off Punta Patuca, Atlantic Honduras (AMNH 238556).

Figures 1–12, ×1.



Explanation of Figures 13 to 25

Figures 13–15a, b. *Distorsio minoruohnishii* Parth, 1989. Figures 13, 14: specimen with fully developed apertural morphology, off Isla Macapule, Sinaloa, Mexico, topotype (AMNH 232198). Figures 15a, b: holotype (BM[NH] 1990025).

Figures 16–18. *Distorsio jenniernestae*, sp. nov., a growth series showing the prominent marginal groove developed in the largest specimen (Figure 18), off Isla Macapule, Sinaloa, Mexico (AMNH 232199).

at the periphery of the body whorl (not developed in specimens with fewer than 6 postnuclear whorls; see Figures 16–18). Parietal shield extending to the suture, thin with 4 to 6 axial ribs below the suture, replaced by 5 or more weak spiral ribs below, blending into the aperture. Columellar inner edge with 8–10 plicae, with the upper 2 (posterior) the largest. Siphonal canal broadly open, short, and recurved slightly upwards. Basic color white and straw-tan, early whorls darker tan, parietal shield and outer lip orange-brown with streaks of white, aperture glossy white. Animal orange-brown with white blotches (KERSTITCH, 1989:fig. 89). Periostracum tan-brown, thin, flaky, with numerous short hairs; darker hairs in clusters along the axial ribs. Operculum small, oblong, terminal with several concentric fine lines on outer surface, and with wide marginal, raised callus and broad bands of uneven rings on inner surface.

Type locality: Dredged in 73 m between Isla Cébaco and Isla Coiba, off the Pacific coast of Veraguas, Panama, J. Ernest, 1991.

Type depositories: Holotype (AMNH 232214; Figures 5, 6; H = 59.9 mm, W = 32.3 mm) and 4 paratypes (AMNH 232215; Figures 7, 8); 2 paratypes (USNM 860245); 2 paratypes (DMNH 189600); 1 paratype (DSIR-GG WM 15345) and 10 paratypes (B. J. Piech coll.); all from the type locality.

Distribution: Golfo de California, Mexico, to the Golfo de Panamá, and the Galapagos Islands.

Specimens examined: MEXICO: Golfo de California, off Isla Tiburón, P-AMNH Station 162, in 73 m (AMNH 77066), illustrated as *Distorsio constricta* (Broderip) by EMERSON & OLD (1963:27, fig. 24); off Isla Angel de la Guardia, in 93–102 m, AHF station 40-29, 1 specimen (LACMNH 40-29.1). Between Isla Partida and Espiritu Santo, in 73–165 m, AHF Station 60-61, 1 specimen (LACMNH 60-6.9); off Punta Coyote, Bahía de La Paz, Baja California Sur, dredged in 45 m, by commercial fishermen, 2 specimens (AMNH 232192) *ex* Abbey Specimen Shells. Off Cabo Pulmo, in 91 m, AHF 1732-49, 1 specimen (LACMNH 49-73.1); off Cabo San Lucas, Baja California Sur, in 137 m, AHF Station 618-37, 1 specimen (LACMNH 37-19.2); Bahía Guaymas, Sonora, dredged in 30 m by fishermen, 1 specimen (AMNH 240421a), *ex*

R. Purdy coll.; off Cabo Haro, Sonora, in 183 m, AHF station 60-31, 3 specimens (LACMNH 60-3.4). Isla Macapule, Sinaloa, dredged in 45 m by A. Luna, 4 specimens (AMNH 232199), *ex* S. Bennett coll. COSTA RICA: Off Bahía de Ballenas, Golfo de Nicoya, in 64 to 82 m, TCE Station 213-0-11-17, in 64 m, 2 specimens (AMNH 85336) (together with 2 specimens of *D. minoruohnishii* Parth); off Isla del Cano (8°45'N, 84°0'W) in 73–82 m, 1 specimen, J. McLean *leg.* (LACMNH 72-67.2). PANAMA: Golfo de Chiriquí, 1 specimen, *ex* M. Parth coll. (AMNH 232183); between Isla Cébaco and Isla Coiba, in 73 m, type locality, 20 specimens. ECUADOR: Galapagos Islands, SE of Isla Daphne (0°27'S, 90°21.8'W), AHF Station 38-48, in 101 m, 1 specimen (LACMNH 38-48.1).

Remarks: Mature specimens of the new species may be distinguished without difficulty from the other three species of *Distorsio* recognized in the eastern Pacific Ocean (Table 1). The “big notch” on the outer lip is present in specimens with six or more postnuclear whorls (*cf.* Figures 16–18). The function, if any, of this groove is not known. Joseph Houbriek (personal communication, 24 September 1991) speculated that perhaps it serves as an egg laying sinus or possibly a penile groove, owing to the location of the bursa copulatrix and penis, respectively, in the related families Ranellidae and Bursidae (HOUBRIEK & FRETTER, 1969: 417). With the exception of *Distorsio decussata*, the embryonic whorls of all the west American species are similar, consisting of 2½ smooth, glossy whorls. This character is not useful in separating the other three taxa (Figures 23–25).

The new species is distributed intertidally to depths of 137 m from near the head of the Gulf of California to the Gulf of Panama. It is also known from the Galapagos Islands in 101 m. *Distorsio minoruohnishii* is largely sympatric in range with the new species in depths to 80+ m, but it also extends southward to northern Peru. In contrast, *D. constricta* is restricted in distribution to the southern part of the Panamic faunal province, with records from Costa Rica to Ecuador, in tidal waters to depths of 27 m.

The interspecific relationships of the new species and the three other west American species are somewhat difficult to interpret. *Distorsio constricta* in the Pacific and *D. macgintyi* EMERSON & PUFFER (1953:101; OLSSON & MCGINTY, 1951:27, pl. 1, figs. 5, 6, 9) in the Atlantic were considered to be geographical subspecies (BEU, 1985:

Figures 19, 20. *Distorsio habeii* Lewis, 1972, off Panglao, Bohol, Philippines (AMNH 232189).

Figures 21, 22: *Distorsio decussata* (Valenciennes, 1832), neotype, off Punta Arena, Gulf of California, TCE Station 136-D-21, in 82 m (AMNH 85335).

Figures 23–25. Spires enlarged to show embryonic whorls. Figure 23: *D. constricta* (AMNH 232205). Figure 24: *D. jenniernestae*, sp. nov. (AMNH 232199, specimen shown in Figure 16). Figure 25: *D. minoruohnishii* (AMNH 174247).

Figures 13–22, ×1; Figures 23–25, ×3.5.

62; EMERSON, 1991:73, table 4) before the discovery of more than one species in the *D. constricta* complex. OLSSON & MCGINTY (1951:27), LEWIS (1972:46), and others believed that *D. simillima* (SOWERBY, 1850:48) from the Miocene of the Caribbean region was the precursor of this cognate pair. Unfortunately, Sowerby did not provide an illustration of his *D. simillima* from the Dominican Republic and this name has been applied to various species concepts (cf. WOODRING, 1959:206). PFLUG (1961:39–41, pl. 9, figs. 4, 6, 9) selected and illustrated a lectotype of *D. simillima*. On the basis of this lectotype designation, *D. simillima* is not referable to the *D. constricta* complex. Pflug's lectotype is clearly related to *D. decussata* (VALENCIENNES, 1832:306). The closeness of the lectotype in shell characters to the Mid-American Pliocene *D. gatunensis* TOULA (1909:700, pl. 25, fig. 10; BROWN & PILSBRY, 1911:356, fig. 8; WOODRING, 1959:205, pl. 34, figs. 7, 8; AGUILAR & FISCHER, 1986:223, pl. 2, figs. 13, 14) suggests that Toulou's taxon is closely related to *D. simillima*. MAURY (1917:107, pl. 17, figs. 4, 5) considered *D. gatunensis* a junior synonym of *D. simillima*. Beu (*in litt.*, to W. K. Emerson, 25 October 1991), however, believes *D. gatunensis* to be identical with *D. decussata*. This leaves the Pliocene precursor of the *D. constricta* complex (WOODRING, 1928:pl. 18, fig. 9 and pl. 19, fig. 1) from Panama and elsewhere in the New World tropics without a name. Further study is needed to determine if the fossil populations of *D. constricta* require specific recognition. *Distorsio crassidens* (CONRAD, 1848:118, pl. 11, fig. 40; MACNEIL & DOCKERY, 184:121, pl. 31, figs. 5, 6) from the Vicksburg Group of Mississippi (Oligocene) and *D. simillima* (Mio-Pliocene) appear to be linear antecedents of *D. decussata*. *Distorsio clathrata* (LAMARCK, 1816:pl. 413, fig. 4a, b), on the other hand, has a Pliocene presence in the Caribbean region (WOODRING, 1928:pl. 19, figs. 2, 3; RUTSCH, 1930:pl. 17, figs. 4, 5). It is also known from the Ecuadorian Pliocene (OLSSON, 1964:174, pl. 30, figs. 1–1b), although it did not survive in the Pacific after the closure of the Mid-American seaways.

Both *Distorsio minoruohishii* and *D. jenniernestae* may have evolved from the Neogene *D. constricta* stock in the equatorial waters of Central America, or from some yet unrecognized stocks. On the other hand, the relationship of these two species with the Indo-Pacific *D. habeii* LEWIS (1972:38, figs. 38, 39) is not clear. Until recently, *D. habeii* was recognized as a geographical subspecies of *D. constricta* (cf. BEU, 1985:62; LEWIS, 1972:44, figs. 38–39; EMERSON, 1991:68). Perhaps genetic differences determined by molecular studies could shed more light on the relationships of these taxa.

Distorsio (Distorsio) decussata
(Valenciennes, 1832)

(Figures 21, 22)

Tritonium decussatum VALENCIENNES, 1832:306; EMERSON & PUFFER, 1953:99; KILLAS, 1973:203, in part, name only, excluding references to *Distorsio constricta*.

Distorsio decussatus Valenciennes: PILSBRY & OLSSON, 1941:40, pl. 5, fig. 9; HERTLEIN & STRONG, 1955:265, 266; EMERSON & OLD, 1963:27, fig. 25; KEEN, 1971:508, fig. 963; LEWIS, 1972:43, figs. 36, 37; PARTH, 1991a:11, 2nd row, four specimens illustrated.

Type locality: "Habitat cum praecedente [*Tritonium hemastoma*] ad portum Acapulco," Guerrero, Mexico.

Type depository: There are no specimens of this taxon among Valenciennes' type material in the Muséum National d'Histoire Naturelle, Paris. The types are presumed to be lost (A. Beu, *in litt.*, to W. K. Emerson, 25 October 1991). In the absence of any known type specimens, we here designate as the neotype of *D. decussata* (Valenciennes, 1832) a specimen dredged from the Arena Bank, Baja California Sur, Mexico (23°29'N, 109°25'W) in 82 m (AMNH 85335, see Figures 21, 22).

Distribution: Golfo de California, Mexico to Manta, Ecuador (HERTLEIN & STRONG, 1955).

Material examined: 34 lots in the AMNH collection, from Mexico, Panama, Colombia, and Ecuador.

Remarks: VALENCIENNES (1832:306) did not illustrate his new species from Acapulco, Mexico. He stated *Distorsio decussata* was intermediate in characters between *D. anus* and *D. clathrata*. He compared his species with *D. clathrata*, noting differences in the anal sinus and the columellar plicae. He described a small (H = 54 mm), weakly distorted, white shell with reddish spots on the parietal shield, and he noted the presence of uneven labial plicae of which the third plica was the largest. The siphonal canal was described as elongated and thin edged. For the purpose of nomenclatural stability, we have selected a neotype (see above).

This is the largest of the four west American species, attaining more than 85 mm in length (AMNH 226426; dredged off Veraguas, Panama, J. Ernest, 1991). The weak distortion, long siphonal canal, deeply grooved columellar notch, and very large third plica on the inner edge of outer lip serve to characterize this species (Table 1). The periostracum on the outer surface is dark brown and covers a tannish basal layer (cf. LEWIS, 1972:37). A delicate prominent single hair occurs on the nodules formed at the intersection of the axial and spiral cords.

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